

Comment on the proposed designation of *Isospora suis* Biester, 1934 as the type species of *Isospora* Schneider, 1881 (Protista, Apicomplexa)

(Case 3187; see BZN 58: 272–274)

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As a coccidial biologist who has published over 150 species descriptions and redescrptions during the last 20 years, I write in opposition to the proposal to designate *Isospora suis* Biester, 1934 as the type species of the genus *Isospora* Schneider, 1881.

In his application Modrý has proposed the designation of a new type species for *Isospora* and to transfer the genus and some species from the EIMERIIDAE Minchin, 1903 into the SARCOCYSTIDAE Poche, 1913. While I concur that a new type species should be designated, and agree with the published literature that the genus is polyphyletic and currently includes members of two separate families, I disagree with the proposed approach since it would involve needlessly giving a new generic name to virtually all species within both families. Instead, it is desirable to retain the majority (80% of the total number) of the more than 250 *Isospora* species in the EIMERIIDAE and exclude approximately 50 species, including *I. suis*, most closely allied with the SARCOCYSTIDAE. The excluded species would then receive a new generic name, the first available being the commonly used *Cystoisospora* Frenkel, 1977 (see para. 4 below). The following points are presented for consideration.

1. The original description by Schneider (1881) of the genus *Isospora* and illustration of the oocysts strongly suggest that it represented an avian pseudoparasite. Although reported to have been found associated with 'a little black slug', the shape and characteristics of the oocysts and sporocysts are identical to the general isosporan morphology found in passeriform and related birds; the parasite has never been rediscovered. The only originally included species, *I. rara* Schneider, 1881, was reported to produce two piriform spores. The line drawings and description are both clear about the shape of the sporocysts and it is quite obvious that each had what are now termed Stieda bodies (sporocyst plugs) at the pointed ends, typical of avian isosporans. By the end of the 19th century over 30 different avian species and one lizard were known hosts for these morphologically similar isosporans (see Candorelli Francaviglia & de Fiore, 1892; Hagenmüller, 1898; Labbé, 1893, 1896, 1899; Laveran, 1898; Sjöbring, 1897). The only isosporan known at this time to lack Stieda bodies on the sporocysts was an anuran isosporan (currently *I. lieberkuehni* (Labbé, 1894)).

2. For *Isospora*, Schneider (1881) was uncertain about the exact numbers of sporozoites within each sporocyst and he simply referred to the sporozoites as being 'numerous'. This uncertainty led to a taxonomic scheme at the generic level based solely on perception errors about the numbers of sporozoites within the sporocysts (see Labbé, 1893, 1894, 1896, 1899). Thus, the genus *Isospora* was erroneously defined as being polyzoic (see Labbé, 1893). Subsequently new genera were introduced to accommodate the differing numbers of sporozoites. The genus *Diplospora* Labbé, 1893 (p. 1301 in *Comptes Rendus de l'Académie des Science*, (3)116 and not p. 407 in (3)117 as cited by Modrý, 2001, BZN 58: 273) was defined as having sporocysts each with four sporozoites, and two new species *D. lacazii* and *D. rivoltae* were proposed for isosporans from the goldfinch *Carduelis carduelis* Linnaeus and

the chaffinch *Fringilla coelebs* Linnaeus respectively. Some authors accepted the name *Isospora* as valid for these morphologically similar coccidia (see Laveran, 1898; Sjöbring, 1897), whereas others employed the multi-generic scheme accepting the new genus *Diplospora* for the avian isosporans (see Hagenmüller, 1898). Laveran & Mesnil (1902) recognized the trivial nature of the errors and synonymized the various genera with *Isospora*. The generic name *Isospora* has been in continual use since 1902 for those homoxenous coccidia within the EIMERIIDAE containing two sporocysts, each sporocyst possessing four sporozoites. By far the majority of the isosporan species were avian.

3. Recent findings have shown the nominal genus *Isospora* to be polyphyletic; it may soon need to be split into two or more genera. Limited molecular analyses by Carreno et al. (1998), Carreno & Barta (1999), Franzen et al. (2000), Barta et al. (2001) and Modrý et al. (2001) have shown that at least one primate isosporan (*I. belli* Wenyon, 1923 from humans), two carnivore isosporans (*I. felis* Wenyon, 1923 from felids and *I. ohioensis* Dubey, 1975 from canids), as well as *I. suis* Biester, 1934 from piglets and *I. lieberkuehni* (Labbé, 1894) from frogs, are all more closely related to the cyst-forming coccidia (i.e. *Toxoplasma* and *Sarcocystis*) than to two of the avian (passeriform) isosporans (*I. robini* McQuistion & Holmes, 1988 from *Turdus migratorius* Linnaeus and *I. gryphoni* Olsen, Gissing, Barta & Middleton, 1998 from *Carduelis tristis* Linnaeus). All valid primate and carnivore isosporans lack Stieda bodies, as do the morphologically similar *I. suis* from swine and *I. lieberkuehni* from frogs, whereas avian isosporans all have distinct Stieda bodies.

4. The genus *Cystoisospora* Frenkel, 1977 (type species *Isospora felis* Wenyon, 1923) was established for those isosporans of carnivores that form dormant unizuite stages in multiple organs of facultative intermediate hosts (see Frenkel, 1977). None of the species possessed Stieda bodies on the sporocysts. Dormant unizuite cysts have been reported for *I. belli* in humans (see Michiels et al., 1994; Lindsay et al., 1997; Restrepo et al., 1987; Velasquez et al., 2001), but not for *I. suis* from swine (see Pinckney et al., 1993). Since 1977 most of the commonly studied isosporans of carnivores and primates have already been transferred into *Cystoisospora* (family SARCOCYSTIDAE).

5. If *Isospora suis* were designated the type species of *Isospora*, and if the genus is split into two genera as commonly suggested, it would result in the 'historically wrong' lineage being assigned to the SARCOCYSTIDAE and name changes for virtually all existing species. I propose the retention of *Isospora* within the EIMERIIDAE thereby conserving the published names of approximately 80% of the species. The type species should be an avian isosporan with early historical significance, and *Diplospora lacazii* Labbé, 1893 (para. 2 above) is a suitable choice since its taxonomic status has been extensively reviewed (see Levine, 1982).

6. The International Commission on Zoological Nomenclature is accordingly asked:
 - (1) to set aside the proposals in BZN 58: 273 (Case 3187);
 - (2) to use the plenary power to set aside all previous fixations of type species for the nominal genus *Isospora* Schneider, 1881 and to designate *Diplospora lacazii* Labbé, 1893 as the type species;
 - (3) to place on the Official List of Generic Names in Zoology the name *Isospora* Schneider, 1881 (gender: feminine), type species *Diplospora lacazii* Labbé, 1893 as designated in (2) above;

- (4) to place on the Official List of Specific Names in Zoology the name *lacazii* Labbé, 1893, as published in the binomen *Diplospora lacazii* (specific name of the type species of *Isoospora* Schneider, 1881);
- (5) to place on the Official Index of Rejected and Invalid Generic Names in Zoology the name *Diplospora* Labbé, 1893 (a junior objective synonym of *Isoospora* Schneider, 1881).

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Two different approaches for resolving nomenclatural difficulties relating to *Isospora* Schneider, 1881 have been proposed to the Commission. The first approach was published as Case 3187 in BZN 58: 272–274 (December 2001) and the second in the comment above. Without expert advice it will be difficult for the Commission to provide a ruling that will best serve the medical and veterinary professions as well as protistologists and parasitologists. It has been drawn to the attention of the Secretariat by Dr Upton that discussions on the taxonomy of *Isospora* are planned for the 10th International Congress of Parasitology, which will be held in British Columbia, Canada, in August 2002. Numerous coccidian biologists will be present, and one session will attempt to reach a consensus on how to split the genus *Isospora*, name the resulting genera and resolve the type species issue. The Commission Secretariat hopes to publish a summary of the discussion on *Isospora* in the *Bulletin* in due course. This will allow the Commission to take into consideration the recommendations of the Congress when ruling in relation to Case 3187.

Further comments on all aspects of this case are invited.

Comment on the proposed conservation of *Hydrobia* Hartmann, 1821 (Mollusca, Gastropoda) and *Cyclostoma acutum* Draparnaud, 1805 (currently *Hydrobia acuta*) by the replacement of the lectotype of *H. acuta* with a neotype; proposed designation of *Turbo ventrosus* Montagu, 1803 as the type species of *Ventrosia* Radoman, 1977; and proposed emendation of spelling of HYDROBIINA Mulsant, 1844 (Insecta, Coleoptera) to HYDROBIUSINA, so removing the homonymy with HYDROBIIDAE Troschel, 1857 (Mollusca)

(Case 3087; see BZN 55: 139–145; 56: 56–63, 143–148, 187–190, 268–270; 58: 56–58, 140–141, 301–303)

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We fully support the application.

The phylogeny and taxonomy of *Hydrobia* Hartmann, 1821, based on shell morphology, ultrastructure and soft part anatomy, have been studied in our Department of Malacology for about 30 years (see Falniowski, Dyduch & Smagowiec, 1977; Falniowski, 1986, 1987, 1988, 1990; Falniowski & Szarowska, 1995; Falniowski, Szarowska & Mazan, 1996). Thus, we feel well qualified to present our views on the current application.